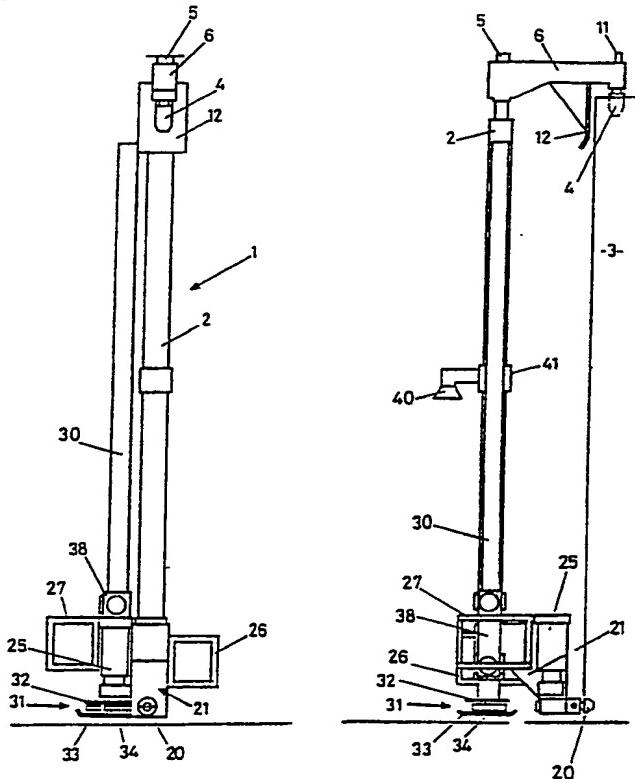


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(54) Title: IMPROVEMENTS IN OR RELATING TO A LIFTING DEVICE AND/OR A METHOD OF LIFTING**(57) Abstract**

The invention comprises a method of loading or unloading a transportable container onto or from a transporting vehicle. The method involves engaging each of the four corner regions of the container (3) with an apparatus (1, 43) having a powered extendable and retractable leg (2). To unload the container from the transporting vehicle shown in Fig. 5, each leg (2) is synchronously lowered so that they engage the ground surface and accordingly lift the container (3). The transporting vehicle is then moved from under the container (3). Alternatively, if the container (3) is to be loaded onto the transporting vehicle shown in Fig 5, the deck of the transporting vehicle is positioned under the container (3) once the legs (2) have been lowered. Then, synchronously each of the legs (2) is raised so as to lower the container (3) onto the ground or to lower the container (3) onto the deck of the transporting vehicle. Each apparatus (1, 43) is then disengaged from the corner regions of the container (3). The invention also relates to the apparatus for loading or unloading a container (3) onto or from a transporting vehicle. Four lifting devices (1, 43) are provided each having an extendable leg (2) formed by a piston and cylinder assembly. Each lifting device (1, 43) has a peg (4) which engages an upper aperture in a container (3), a second locating means (20) is provided for engaging the lower part of the container (3) and a foot (31) for contacting the ground surface. The apparatus can be used to relocate containers (3).



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IMPROVEMENTS IN OR RELATING TO A LIFTING DEVICE
AND/OR A METHOD OF LIFTING

TECHNICAL FIELD

- 5 This invention relates to a lifting device and/or a method of lifting and has been devised particularly though not necessarily solely for use in lifting containers.

BACKGROUND ART

Known hydraulic lifting devices for containers have the disadvantage that the hydraulic hoses are run from the lifting devices back to a base or common point. This 10 is of course disadvantageous in that there is substantial risk of damage to the hoses for example by moving vehicles or other agencies and in that the setting up time before the container can be raised so as to enable for example a truck to be placed beneath the container is prolonged.

It is therefore an object of the present invention to provide a lifting device and/or 15 a method of lifting which will at least provide the public with a useful choice.

DISCLOSURE OF THE INVENTION

Accordingly, in a first aspect the present invention consists in a method of loading or unloading a transportable container onto or from a transporting vehicle therefor which comprises:

20 engaging each corner region of the container with apparatus having a powered extendable/retractable leg;

substantially synchronously lowering each leg to thereby engage a support surface (such as the ground) to cause the lifting of the container;

25 moving the transporting vehicle, if unloading, from under the container, or, if loading, to be in a container transporting location under the container;

substantially synchronously raising each leg to tend to disengage the support surface(s) thereby lowering the container onto the ground or onto the transporting vehicle respectively; and

disengaging said apparatus from each corner region.

30 Preferably each apparatus engages a corner region of the container with a portion that inserts vertically down into the top of the container and a lower region that inserts substantially horizontally into the container.

Preferably said apparatus can be moved from one wall to the adjacent wall about

a corner of the container without removing the engagement into the top of the container provided the substantially horizontal engagement into the side of the container is momentarily disengaged.

- Preferably each powered leg is actuatable hydraulically and the powering of the
- 5 hydraulic system is by means of a rechargeable storage battery carried by each of the four apparatus each of which is to be engageable to a corner region of the container.

Preferably the engagement and/or engagement of each said apparatus to or from each corner region is performed using a carriage vehicle therefor.

- Preferably said carriage vehicle is a vehicle having members capable of engaging
- 10 sockets or male members of each apparatus in a complementary manner.

Preferably the synchronous lowering and/or raising is by the control of one of the apparatus (hereafter the "master apparatus") and the synchronous operation of the three remaining slave apparatus, a signal being directed to each of the slave apparatus by means of an electrical signal, a light or radio signal or a vibration.

- 15 Preferably the signal from the master unit of the apparatus is by radio signal.

Preferably a broadcast signal receivable by each one of the apparatus having an extendable/retractable leg ensures the synchronous control of the lowering and/or raising.

- Preferably prior to the engaging step and subsequent to the disengaging step each
- 20 of the four units of apparatus are engaged (i) onto a carrying vehicle having a capability of recharging storage batteries carried by each or (ii) with a recharging facility.

- In a further aspect the present invention consists in apparatus substantially as hereinafter described with reference to any one, some or all of the accompanying
- 25 drawings useful in the performance of a method as previously defined or parts thereof as hereinafter described.

Accordingly in a further aspect the invention consists in a lifting device suitable for use in a method of loading or unloading a transportable container onto or from a transporting vehicle therefor which method comprises the steps of:

- 30 engaging each corner region of the container with a said lifting device,
- synchronously (or almost synchronously) lowering a leg of each lifting device to thereby engage a support surface (such as the ground) to cause a lifting of the container,

moving the transporting vehicle, if unloading, from under the container or, if loading, to be in a container transporting location under the container,

synchronously (or almost synchronously) raising a leg of each lifting device to 10 to disengage the support surface(s) thereby lowering the container onto the ground or

5 onto the transporting vehicle respectively, and

disengaging each lifting device from each corner region, said device comprising:

an extendable leg assembly having an extendable leg,

a first locating means carried by said assembly having means to pass into or engage an upper locating aperture in such a container,

10 a second locating means carried by said assembly having means able to engage a part of said container so by virtue of said first and second locating means engagements substantially vertical movement of the said container can be effected by substantially vertical movement of said second locating means and said first locating means, and

operating means carried by said assembly controllable to cause the powered
15 extension or retracting of said extendable leg relative to the remainder of said assembly and said first and second locating means carried by said assembly.

Preferably said operating means includes a rechargeable storage battery, in a hydraulic system a hydraulic ram and cylinder capable of extending or defining (at least in part) the extendable leg, and a hydraulic pump powered by the storage battery

20 linked to pressurise as controlled the hydraulic system and thus to extend or retract the extendable leg.

Preferably said second locating means are adapted to engage a side aperture in a said container.

Preferably said extendable leg comprises a piston and cylinder assembly, said first

25 locating means and said second locating means being mounted on said cylinder.

Preferably as a foot the extendable leg includes a plate connected to said piston.

Preferably said first locating means further includes a buffer plate positionable in use against the side of a container and said part of said locating means able to pass into or engage about said upper locating aperture in said container comprises a peg.

30 Preferably the vertical position of said peg relative to said extendable leg is adjustable.

Preferably said second locating means includes a rotatable cam.

Preferably a lifting point is provided on said extendable leg.

In a further aspect the invention consists in a method of lifting a container comprising the steps of positioning a lifting device according to any one of the preceding paragraphs adjacent each corner of said container and connected thereto and causing said operating means to extend said leg.

5 BRIEF DESCRIPTION OF THE DRAWINGS

One preferred form of the invention will now be described with reference to the accompanying drawings in which,

Figure 1 is a front elevation of a lifting device according to one preferred form of the invention,

10 Figure 2 is a rear elevation of the lifting device shown in Figure 1,

Figure 3 is a side elevation of the lifting device of Figure 1 from one side,

Figure 4 is a side elevation as in Figure 3 but from the opposite side,

Figures 5 through 13 show a sequence of events (in this case an unloading sequence that, of course, which when reviewed in reverse could be a loading sequence),

15 Figure 5 showing a transporting vehicle (eg. a truck) having a transportable cargo container located thereon,

Figure 6 is a movable transportation system carrying four of the units of apparatus to engage with each corner of a transportable container, there being downwardly directed sockets into which a male member of the associated modified fork lift vehicle

20 can engage to move the same,

Figure 6A is a variant of Figure 6 where a single truck can be used without a trailer,

Figure 7 shows how the male members of the raisable front of modified fork lift apparatus can be used to engage one or several of downwardly directed sockets so as to lift the same free of the truck and to allow the manoeuvring thereof from an end
25 or from a side into an engagement at a corner of a transport container (as space allows),

Figure 8 shows one of the units of apparatus being engaged using the modified fork lift vehicle to a rear corner from a side direction (equally it could be engaged from the end direction),

30 Figure 9 is a similar view to that of Figure 8 but showing an engagement of a unit of apparatus at the front of the same wall of the container,

Figure 10 shows an electrical interconnection (by cable) between that master unit against which the operator is positioned and one of the three slave units each attached

to one of the other three corner regions of the container on the truck,

Figure 11 shows the synchronous lowering of the legs preferably each with a foot member down to ground level thereby raising the container above the deck of the truck,

- 5 Figure 12 shows the arrangement as it was in Figure 11 but after the truck has been driven away from under the container,

Figure 13 shows the container down on ground level after a raising of the legs of each of the apparatus under the synchronous control of the master unit and thus the lowering of the container to ground level, thereafter each of the apparatus being

- 10 capable of being disengaged and removed by a reversal of the arrangement as shown in Figures 8 and 9,

Figure 14 shows a diagram showing the through the top engagement of an apparatus into a corner (either from an end or a side) of the container and the resting against the end or the wall of the apparatus part way down, there being below such a resting a peg or male member adapted to be engaged within a side opening in the end or wall of the container, it being realised that with the arrow head shaped engagement member within the container being shaft mounted there is the prospect of a pivoting with that inter-engagement,

- 15 Figure 14A is a variant of Figure 14 showing a desirable adjustment of the top engagement arrangement to accommodate different arrangements,

Figure 15 shows the preferred apparatus with part of the housing taken away to show parts of the hydraulic and electrical circuits and the preferred two electrical storage batteries (preferably good without recharging for greater than four containers),

- 20 Figure 16 shows in greater detail how downwardly directed sockets of each unit of the apparatus can be engaged by rising complementary male members carried on the boom of a modified fork lift truck,

Figure 17 is a diagram showing a preferred electrical control arrangement of the synchronous actuation, and

- 25 Figure 18 shows the preferred hydraulic control embodied in each of the four units of the apparatus,

Figure 19 is a diagrammatic elevations view showing the engagement of part of the apparatus with a rack on a transport apparatus (eg. as in Figure 6 or 6A),

Figure 20 is an elevational view A-A of the engagement of Figure 19,

Figure 21 shows a lower engagement to rack on a transport apparatus (to complement that of Figures 19 and 20) where a rotatable plate with a latching action can lock through an opening said second locating means,

Figure 22 shows the arrangement (without the second locating means) from 5 direction B-B of Figure 21, and

Figure 23 is an end on, simplified view of a container supported off the ground showing skewing possibilities with synchronous or non-synchronous differential raising or lowering.

BEST MODES FOR CARRYING OUT THE INVENTION

10 In the preferred form of the invention a lifting device and/or a method of lifting a container are provided as follows.

The lifting device 1 comprises an extendable leg 2 which preferably is formed by a piston and cylinder assembly.

First and second locating means are provided desirably engaged with the cylinder 15 of the piston and cylinder assembly 2.

Thus the first locating means is desirably provided at or adjacent the upper end in use of the lifting device and in a preferred form is provided as follows.

A part is provided which engages in an upper aperture in a container 3 and this desirably comprises a peg 4 which may be adjustable vertically in height and for 20 example this adjustment may be achieved in one or both of two ways.

Thus firstly a rod 5 may extend outwardly from the cylinder 2 and over the rod 5 may be positioned an outwardly extending arm 6. The rod 5 passes through a collar part 7 in the rod 6 and adjustment is achieved by providing a series of apertures 8 in the rod 5 and at least one aperture 9 in the arm 7 through which a fixing pin 10 may 25 be positioned in a desired aperture 8.

Secondly the peg 4 may also be provided on a threaded arm 11 which passes through a corresponding threaded aperture not shown in the arm 6 so that by rotating the peg 4 some vertical adjustment is achieved.

The second locating means preferably also includes a buffer plate 12 which is able 30 to be placed against or at least adjacent to a side face 13 of the container 3 so as to provide support or a guide to the peg 4 during insertion thereof in use.

The second locating means preferably comprises a rotatable cam 20 extending outwardly from a mounting plate 21 engaged with the cylinder 2. The cam 20 is

desirably for example of the known type of cam which in one orientation may pass into an aperture in the side of a container and in a second orientation is held within that aperture. Thus the second locating means provides an agency whereby the container 3 may be raised or lowered by the raising or lowering of the cylinder 2.

- 5 The plate 21 may be formed by a box section type construction.

Operating means are provided to cause the leg 2 to be extended or to be allowed to contract. The operating means is associated with the leg 2 and in the preferred form of the invention is mounted thereon.

- 10 The operating means comprises a hydraulic motor or pump 25 and the motor or pump is desirably battery operated and to this end supports to carry the batteries are provided. The battery supports may comprise a pair of battery mounting frames 26 and 27. In the figures for the sake of clarity the batteries are not shown. A guide is provided which is desirably in the form of a second leg 30 upon which is mounted a foot 31.

- 15 The foot 31 may comprise a pair of spaced apart plates 32 and 33 separated by a resilient for example rubber pad 34. Thus some flexibility or resilience of position between the plates 32 and 33 is available.

The foot is also desirably connected to the piston 35 of the piston and cylinder assembly for example through connecting point 36.

- 20 The second leg 30 which is substantially parallel to the leg 2 passes through a collar 38 which is mounted to the leg 2. Thereby the leg 30 provides a guiding action to the extendable leg 2 as it extends and contracts.

- 25 The leg 2 may also provide protection for the piston and cylinder assembly and by providing left and right handed versions of the lifting devices at each corner where the construction is placed in use the leg 2 may be positioned so as to be outwardly placed or at least placed in the position where striking of the construction for example by a vehicle is most likely to occur.

- 30 In order to move the lifting device a lifting point for example a lifting bell 40 may be provided, the lifting bell 40 being mounted to the cylinder 2 for example by a collar 41.

Thus the lifting device can be carried for example by a small forkhoist type device carrying a pin spike shaft or the like able to be positioned in the lifting bell 40.

The use of the invention is as follows.

In use for example four lifting devices according to the invention may be mounted on a truck for example a five ton truck along with a small forkhoist type tractor.

When transported to the desired position the tractor can be unloaded and used to carry the lifting devices into position adjacent the corner of a container to be lifted.

- 5 The lifting devices are then extended so as to raise the container a suitable distance above the ground. Any unevenness in ground surface is compensated for by the floating nature of the foot 31.

- A truck for example can then be backed under the container, the container lowered onto the truck, secured and the lifting device is removed. The reverse procedure can
10 be followed to remove a container from the truck where it is desired to use these lifting devices. It will be apparent that a lifting device may be engaged with a container by hooking the peg 4 into the upper aperture of the container and allowing the twisting lock member 20 to swing into the side aperture. Rotation of the lock member 20 then secures the lifting arrangement in place.

- 15 It will also be apparent that the invention can be modified for example by providing contact between each leg for example by infra red radiation between a suitable sending or transmitting device and receiving device so as to synchronise the movement of the legs.

- Thus it can be seen that at least in the preferred form of the invention a lifting
20 device is provided which has the advantage that the whole of the operating mechanism for each lifting device is contained on the lifting device.

Thus there are no trailing hoses, conduits or wires safe for a short lead containing control switches for example.

- The construction is relatively simple to engage with a container and is able to lift
25 the container in a substantially stable manner to the desired height or to raise a container a small distance above a truck body to allow the truck to be removed and the container to then be lowered to the ground surface. The construction is also relatively simple to remove from a container and therefore provides an effective lifting in use.

- 30 The preferred embodiment is shown in the remaining Figures 5 through 14 inclusive although it is envisaged that the cable interconnection of the master unit of the apparatus to each of the slave apparatus will be replaced as previously mentioned but preferably by a vibration detection unit in each of the slave units to detect vibrational

signals sent through the walls or framework of the transport container from the master unit.

The sequence of events from Figures 5 through 13 have previously been described.

Traditional apparatus for handling containers when a truck in particular is being

- 5 loaded or unloaded is to provide two swing arm members which are permanently carried by the vehicle. Obviously that leads to increased weight being carried by the transporting vehicle, requires a certain amount of space on either side of the vehicle to allow the operation of these swing arms as they side unload the vehicle since a container must be lowered to the ground alongside the vehicle and may also require
- 10 the provision of a large fork lift or other machine for handling the unloaded container subsequently if its location is to be moved.

The apparatus as shown in Figure 6 shows how a small truck with a trailer unit can be used to service the loading and unloading of large trucks which do not carry their own dedicated swing arm container loading or unloading apparatus.

- 15 In the arrangement as shown in Figure 6 the small truck 42 carries four of the units of apparatus 43 and tows a trailer 44 which carries a modified fork lift or the like vehicle 45 with upturned male members 46 adapted to engage preferably two of the downwardly directed socket members 47 of each of the apparatus 43.

- 20 Engagement with the rack on either the truck of Figure 6 or 6A preferably first involves (as shown in Figures 19 and 20) the engagement of end flanged member 49 in a forked guide 74 whereupon member 20 can be inserted into an opening 75 latching member or cam 76 retains the same (eg. at deck level).

- 25 Figure 7 shows how a frame or the like 48 carried by the small truck 42 can engage that portion 49 of each of the units of apparatus that is also shown in Figure 14 as a spacing device between the apparatus 43 and a container wall 50 when a lower male member penetrates the side wall near the bottom of the container (not shown in Figure 14) while the downwardly directed rotatable arrow like member 51 has been received down through the top of the container.

- 30 Figure 14A shows how preferably the member 51 can be adjusted to accommodate different container sizes if need be.

The part 51 (and its support) that engages the upper aperture in container 3 preferably is adjustable as follows:-

Adjustment 1. a fine adjustment 80 to compensate small irregularities,

Adjustment 2, to allow for differing height containers, eg. 8', 8.6' and 9'. This is accomplished by extracting lockpin 81 and removing assembly 85 and slotting into appropriate sockets 82 or 83 via optional extension 84.

The sequence of events as shown in Figures 8 through 13 and the resequencing of such events for the reversal, ie. the loading of a container onto the truck can be readily appreciated. There is, of course, shown the cable 52 linking the master unit 53 to each of the slave units 54 (one only shown from the side view shown in Figure 10). The operator 55 uses a cable connected operating control 56 which will be described in relation to Figure 17.

An obvious feature of the invention, however, is that for many operators the present invention provides a lower capital cost servicing of their container handling needs. It also provides the ability to load a container on to and off a truck or indeed, for that matter any other vehicle (eg. railway truck) without a need to have space alongside the same, ie. a container could, for example, be placed on a railway line, a railway truck backed up to one end thereof and, indeed, under the container once the same has been raised by the use of the four units of apparatus.

The electrical circuit is preferably as shown in Figure 17 showing only in detail within the broken line the dependent circuitry that each of the numbered 1 to 4 circuits would have for the one master unit and then each of the three slave units.

In Figure 17 the reference numerals each represent as follows:

- 57 - fuse in power line
- 58 - power
- 59 - control switch box
- 60, 61 - relays - two switched terminals (isolated) - LUCAS SRD 531
- 62 - solenoid to engage motor
- 63 - electric motor
- 64 - direction control valve

Figure 18 shows the hydraulic layout in which the reference numerals represent:

- 65 - lifting ram
- 66 - gauge
- 67, 68 - counter balance valve unit
- 69 - control valve
- 70 - pump

71 - solenoids 72 of direction control valve 64 of Figure 17

Figure 15 shows how preferably two lead accumulator batteries 72 are located in the apparatus and how a pressure gauge 73 can be provided in the hydraulic circuit
5 without unnecessarily adding to the bulkiness thereof within the housing. Such a gauge 73 can be used to determine the weight of the container.

When the container is being lowered onto a truck the twist lock in the tray of the truck may not be directly in line with the twist lock aperture. In order to generate sideways movement, skewing as in Figure 23 can be utilised by a selective operation
10 of two of the legs of the apparatus.

INDUSTRIAL APPLICABILITY

Persons skilled in the art will appreciate from the various embodiments depicted herein how the apparatus of the present invention collectively and severally lends itself to the overall method in accordance with the present invention.

CLAIMS:

1. A method of loading or unloading a transportable container (3) onto or from a transporting vehicle therefor which comprises:
 - engaging each corner region of the container (3) with apparatus (1,43) having a
 - 5 powered extendable/retractable leg (2);
 - synchronously (or almost synchronously) lowering each leg (2) to thereby engage a support surface (such as the ground) to cause the lifting of the container (3);
 - moving the transporting vehicle, if unloading, from under the container (3), or, if loading, to be in a container (3) transporting location under the container (3);
 - 10 synchronously (or almost synchronously) raising each leg (2) to tend to disengage the support surface(s) thereby lowering the container (3) onto the ground or onto the transporting vehicle respectively; and
 - disengaging said apparatus (1,43) from each corner region.
 - 15 2. A method as claimed in any one of the preceding claims wherein each apparatus (1,43) engages a corner region of the container with a portion (4) that inserts vertically down into the top of the container (3) and a lower region (20) that inserts substantially horizontally into the container (3).
 - 20 3. A method as claimed in Claim 2 wherein said apparatus (1,43) can be moved from one wall to the adjacent wall about a corner without removing the engagement (4) into the top of the container (3) provided the substantially horizontal engagement (20) into the side of the container (3) is momentarily disengaged.
 - 25 4. A method as claimed in any one of the preceding claims wherein each powered leg (2) is actuatable hydraulically and the powering of the hydraulic system is by means of a rechargeable storage battery carried by each of the four apparatus (1,43) each of which is to be engageable to a corner region of the container (3).
 - 30 5. A method as claimed in any one of the preceding claims wherein the engagement and/or disengagement of each said apparatus to or from each corner region is performed using a carriage vehicle (45) therefor.

6. A method as claimed in Claim 5 wherein said carriage vehicle (45) is a vehicle having members (46) capable of engaging sockets (47) on each apparatus (1,43) in a complementary manner.

5 7. A method as claimed in any one of the preceding claims wherein the synchronous lowering and/or raising is by the control of one of the apparatus (53) (hereafter the "master apparatus") and the synchronous operation of the three remaining slave apparatus (54), a signal being directed to each of the slave apparatus (54) by means of an electrical signal, a light or radio signal or a vibration.

10

8. A method as claimed in Claim 7 wherein the signal from the master unit (53) of the apparatus is by radio signal.

9. A method of any one of Claims 1 to 6 wherein a broadcast signal receivable
15 by each one of the apparatus (1,43) having an extendable/retractable leg (2) ensures the synchronous control of the lowering and/or raising.

10. A method as claimed in any one of the preceding claims wherein prior to the engaging step and subsequent to the disengaging step each of the four units (1,43) of
20 apparatus are engaged (i) onto a carrying vehicle (42) having a capability of recharging storage batteries carried by each or (ii) with a recharging facility.

11. A method of loading or unloading a transportable container (3) onto or from a transporting vehicle therefor when performed substantially as hereinbefore described
25 with reference to any one, some or all of the accompanying drawings.

12. Apparatus substantially as hereinbefore described with reference to any one, some or all of the accompanying drawings useful in the performance of a method in accordance with any one of Claims 1 to 11.

30

13. A lifting device suitable for use in a method of loading or unloading a transportable container (3) onto or from a transporting vehicle therefor which method comprises the steps of:

- i engaging each corner region of the container (3) with a said lifting device (1,43),
- ii synchronously (or almost synchronously) lowering a leg (2) of each lifting device (1,43) to thereby engage a support surface (such as the ground) to cause a lifting of the container (3);
- 5 iii moving the transportable vehicle, if unloading, from under the container (3), or, if loading, to be in a container transporting location under the container (3);
- iv synchronously (or almost synchronously) raising a leg (2) of each lifting device (1,43) to tend to disengage the support surface(s) thereby lowering the container (3) onto the ground or onto the transporting vehicle respectively; and
- 10 v. disengaging each lifting device (1,43) from each corner region, such device comprising:
 - an extendable leg assembly having an extendable leg (2),
 - 15 a first locating means carried by said assembly having means (4) to pass into or engage an upper locating aperture in such a container (3),
 - a second locating means carried by said assembly having means (20) able to engage a part of said container (3) so by virtue of said first and second locating means (4 and 20) substantially vertical movement of the said container (3) can be effected by substantially vertical movement of said second locating means (20) and said first locating means (4), and
 - 20 operating means (25) carried by said assembly controllable to cause the powered extension or retraction of said extendable leg (2) relative to the remainder of said assembly (1,43) and said first (4) and second locating means (20) carried by said assembly (1,43).

14. A lifting device of Claim 13 wherein said operating means includes a rechargeable storage battery in a hydraulic system a hydraulic ram and cylinder capable of extending or defining (at least in part) the extendable leg (2), and a hydraulic pump (25) powered by the storage battery linked to pressurise and control the hydraulic system and thus to extend or retract the extendable leg (2).

15. A lifting device as claimed in Claim 13 or 14 wherein said second locating means (20) are adapted to engage a side aperture in a said container (3).

16. A lifting device as claimed in Claim 15 wherein said extendable leg (2)
5 comprises a piston and cylinder assembly, said first locating means and said second locating means being mounted on said cylinder.

17. A lifting device of any one of Claims 13 to 16 wherein said extendable leg (2) at its lower end carries a foot (31).

10

18. A lifting device as claimed in Claim 16 wherein as a foot the extendable leg (2) includes a plate or plates (32 and 33) connected to said piston.

19. A lifting device as claimed in any one of Claims 13 to 18 wherein said first
15 locating means (4) further includes a buffer plate (12) positionable in use against the side of a container (3) and said part of said locating means able to pass into or engage about said upper locating aperture in said container comprises a peg (4).

20. A lifting device as claimed in Claim 19 wherein the vertical position of said peg
20 (4) relative to said extendable leg (2) is adjustable.

21. A lifting device as claimed in any one Claims 13 to 20 wherein said second locating means includes a rotatable cam (20).

25 22. A lifting device as claimed in any one of Claims 13 to 21 wherein a lifting point is provided on said extendable leg (2).

23. A lifting device as in any one of Claims 13 to 22 capable of being used in a method of Claim 2 or 3.

30

24. A method of lifting a container comprising the steps of positioning a lifting device according to any one of Claims 13 to 22 adjacent each corner of said container (3) and connected thereto and causing said operating means to extend said leg (2).

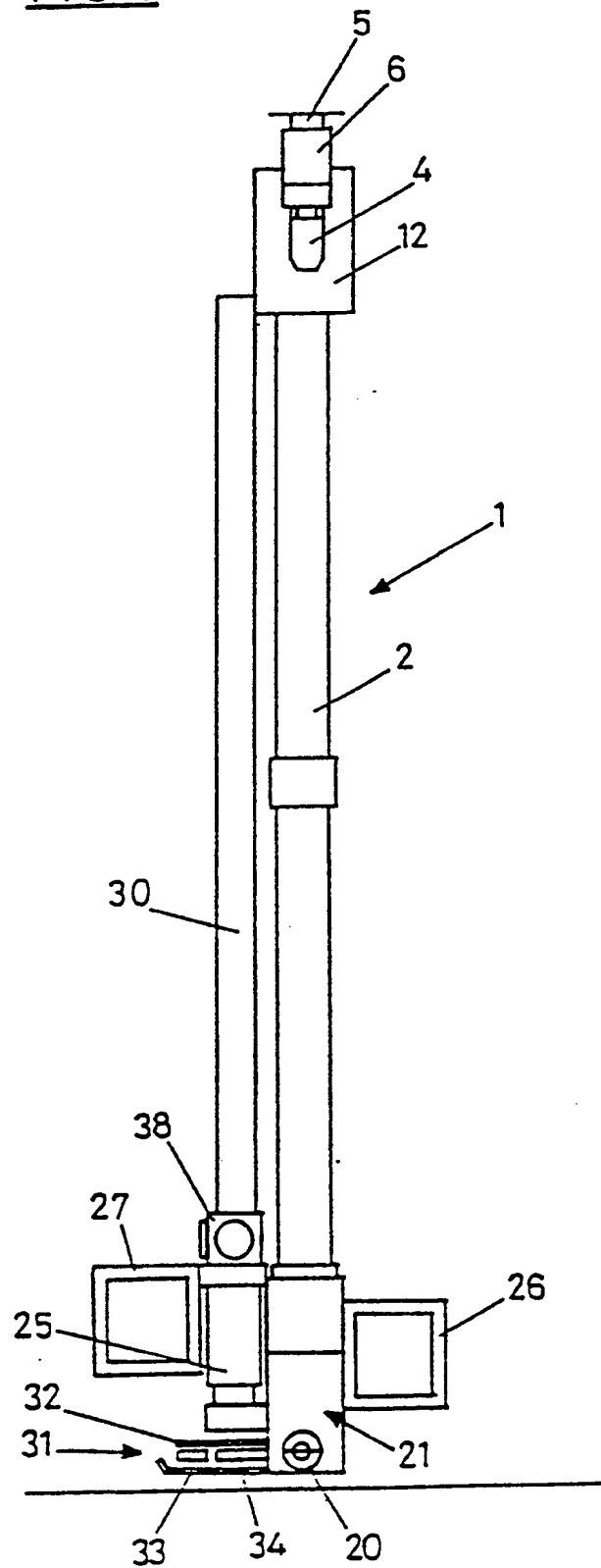
FIG 1

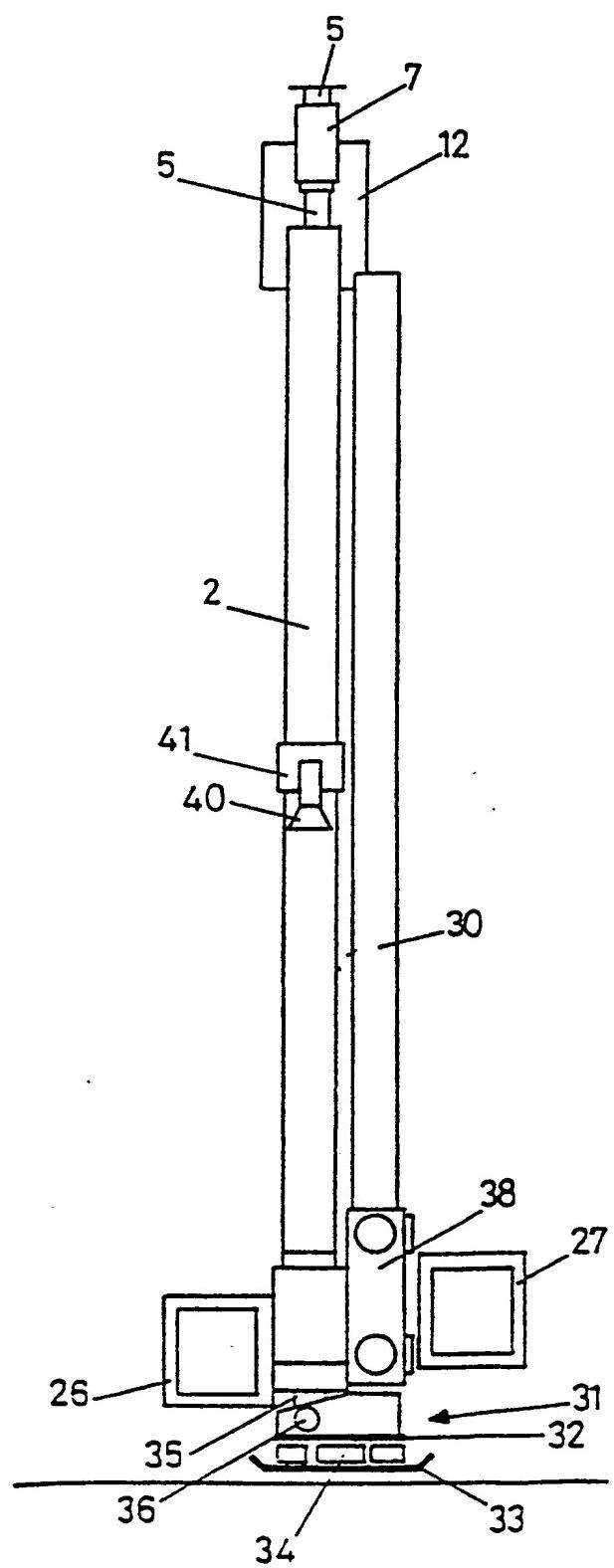
FIG 2

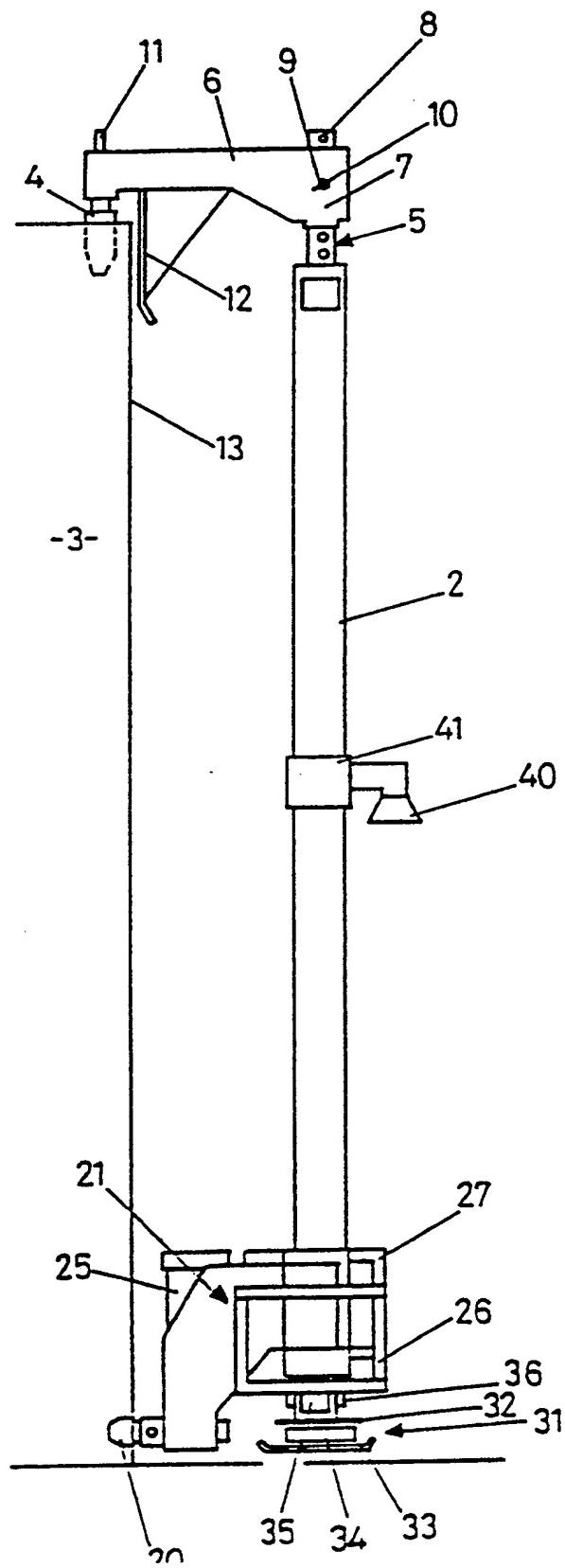
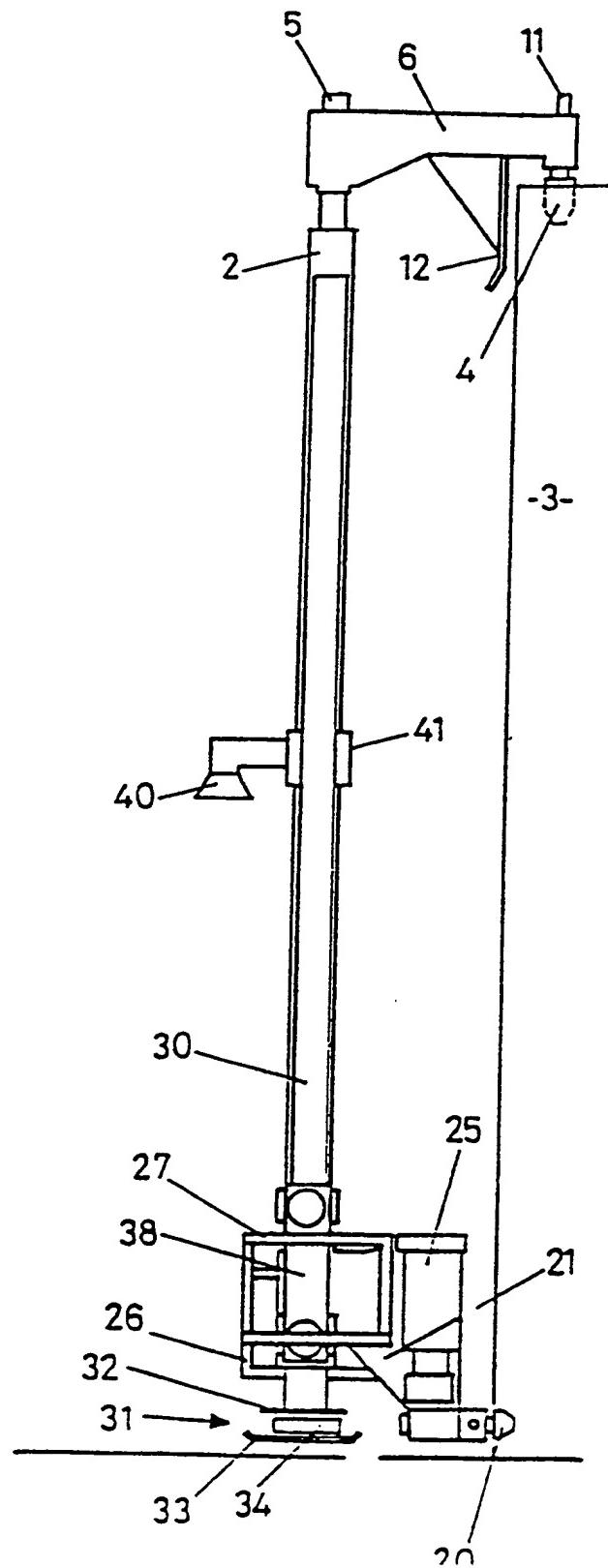
FIG 3

FIG 4

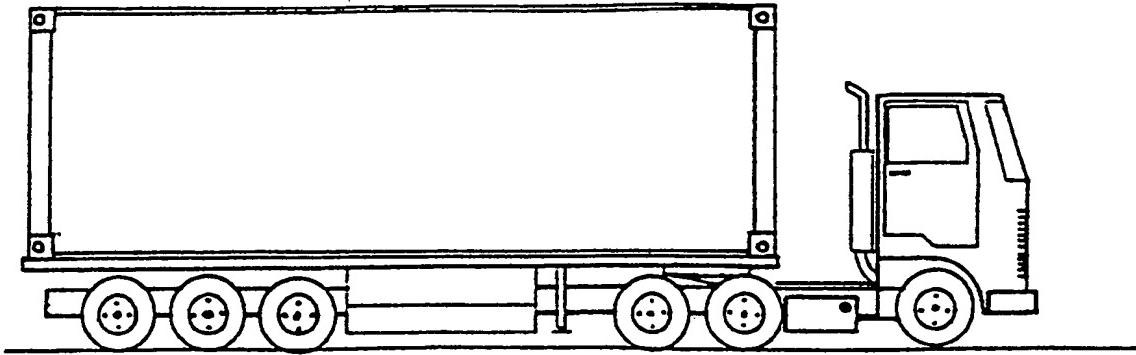


FIG 5

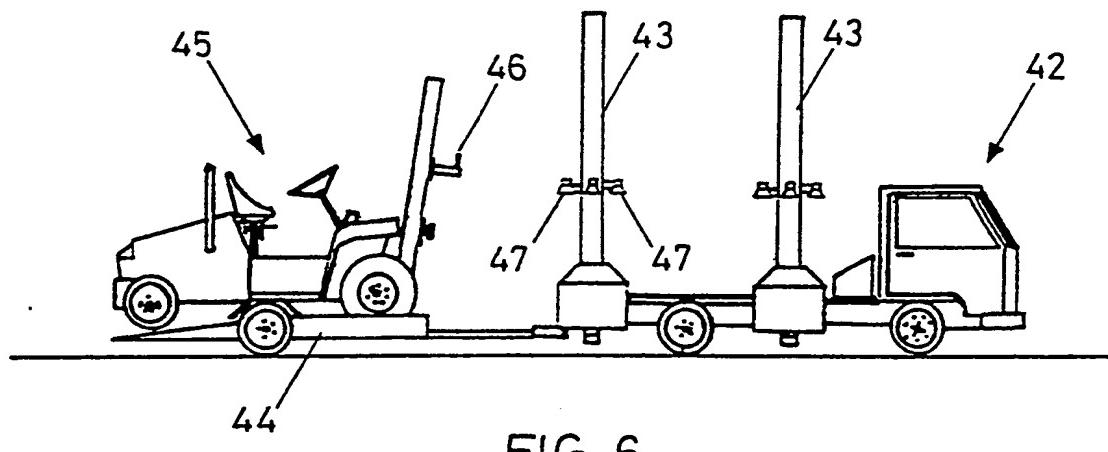
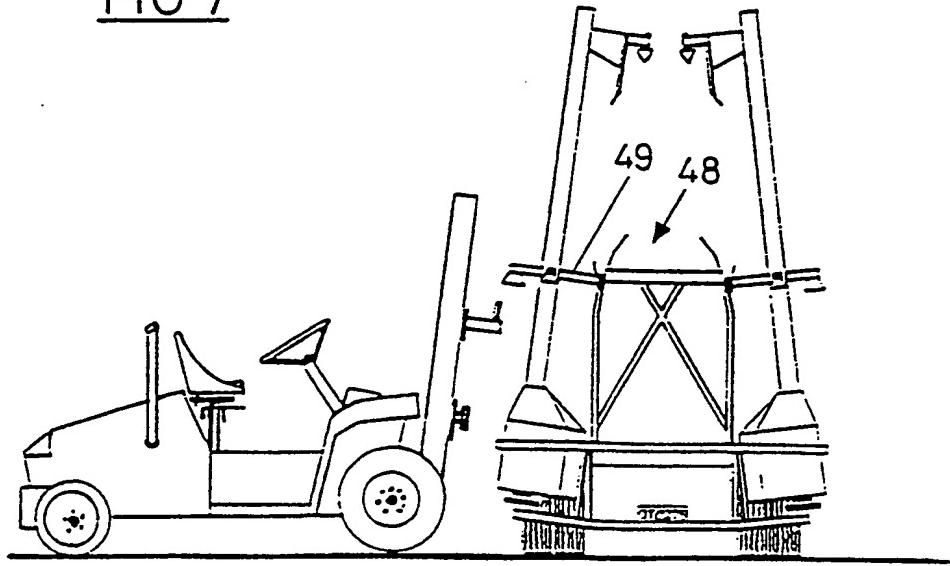


FIG 6

FIG 7



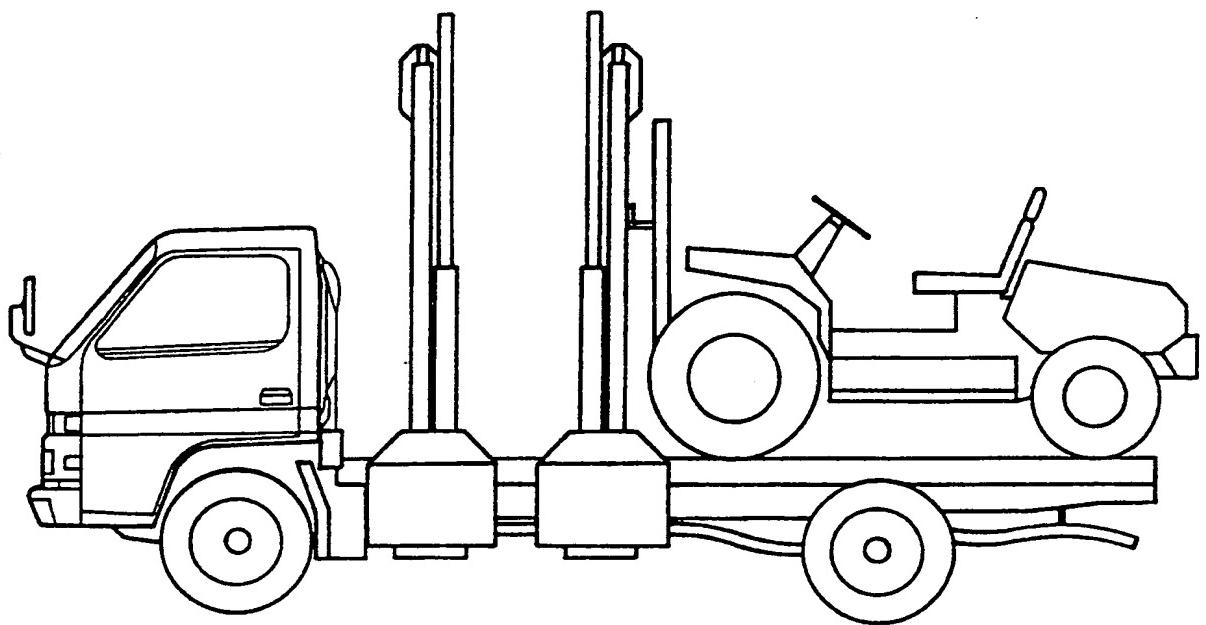


FIG 6A

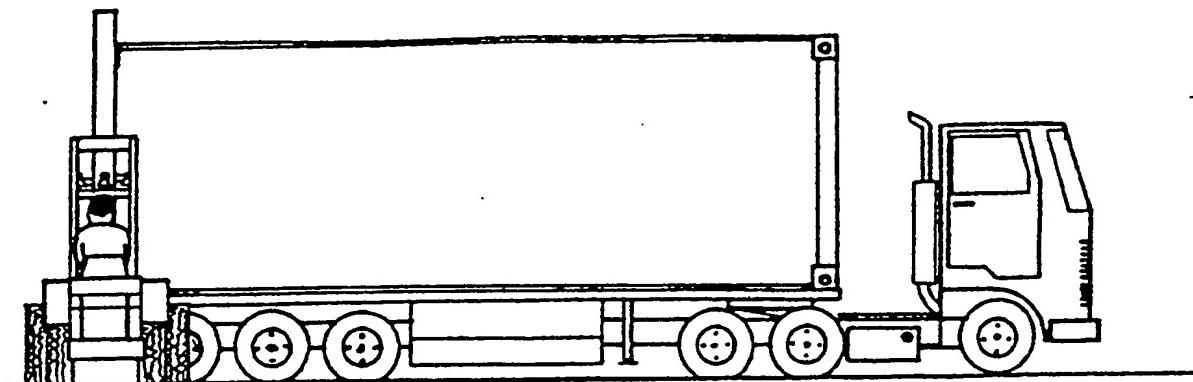


FIG 8

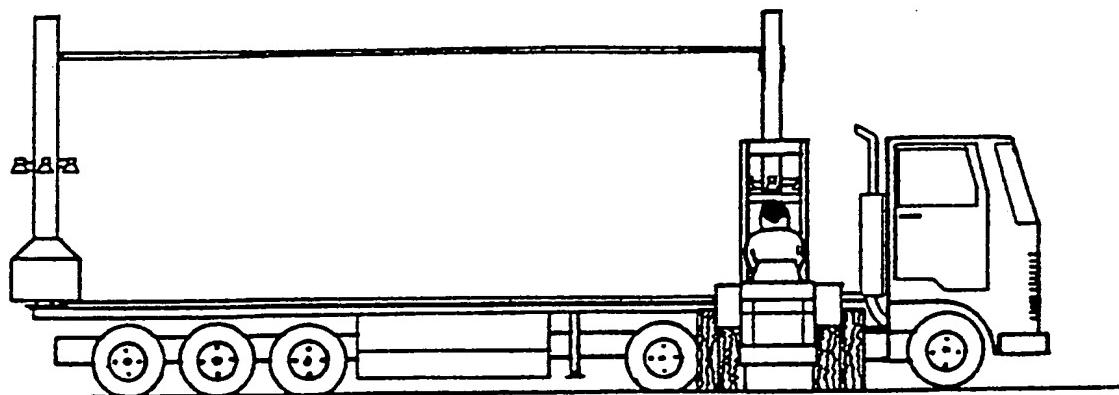


FIG 9

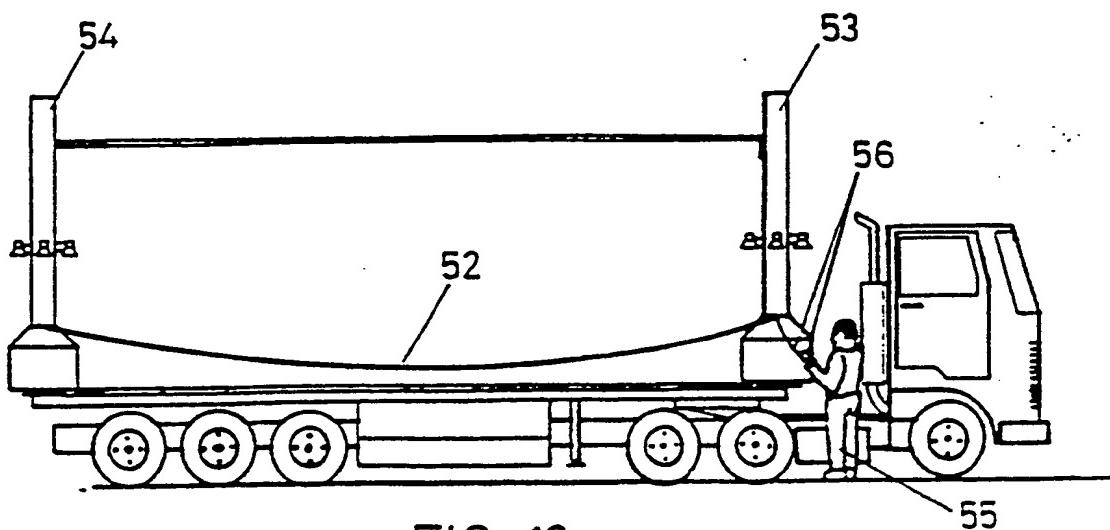


FIG 10

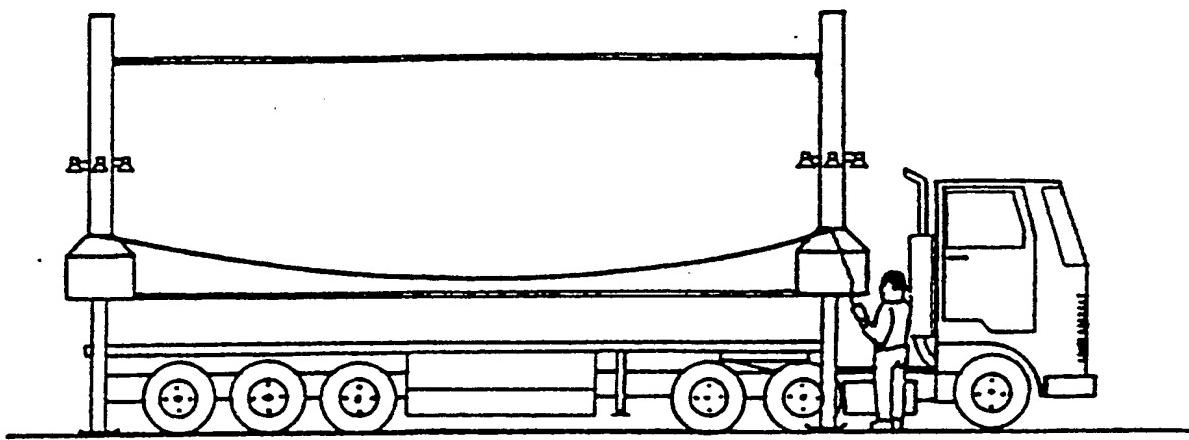


FIG 11

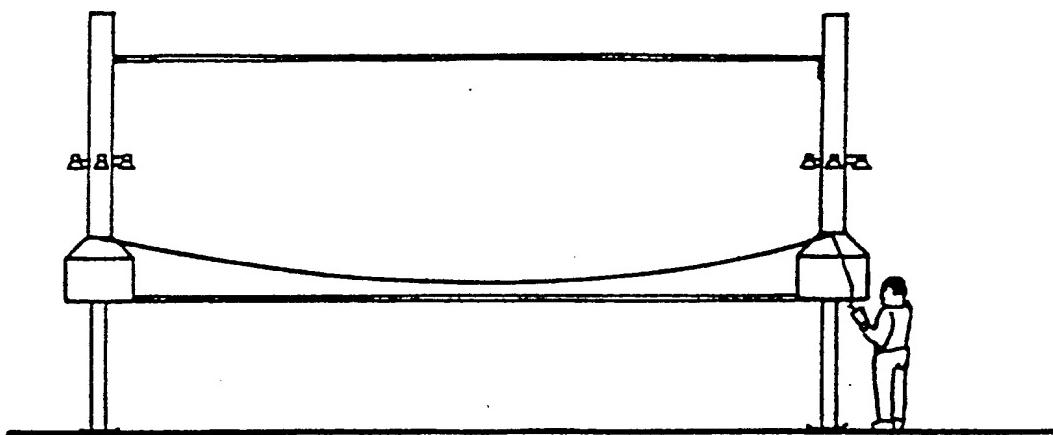


FIG 12

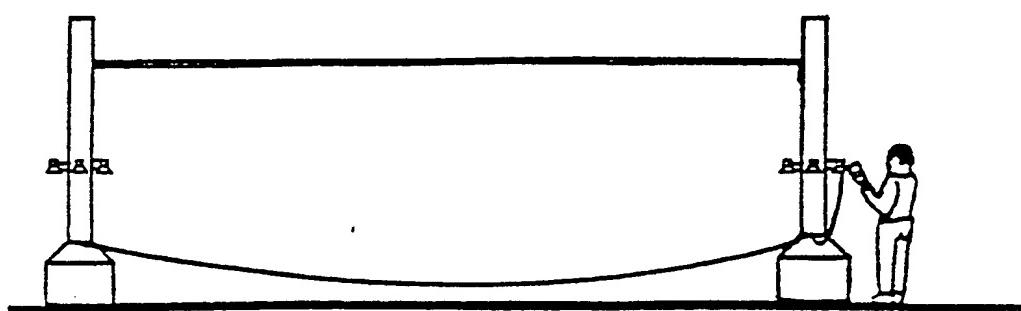


FIG 13

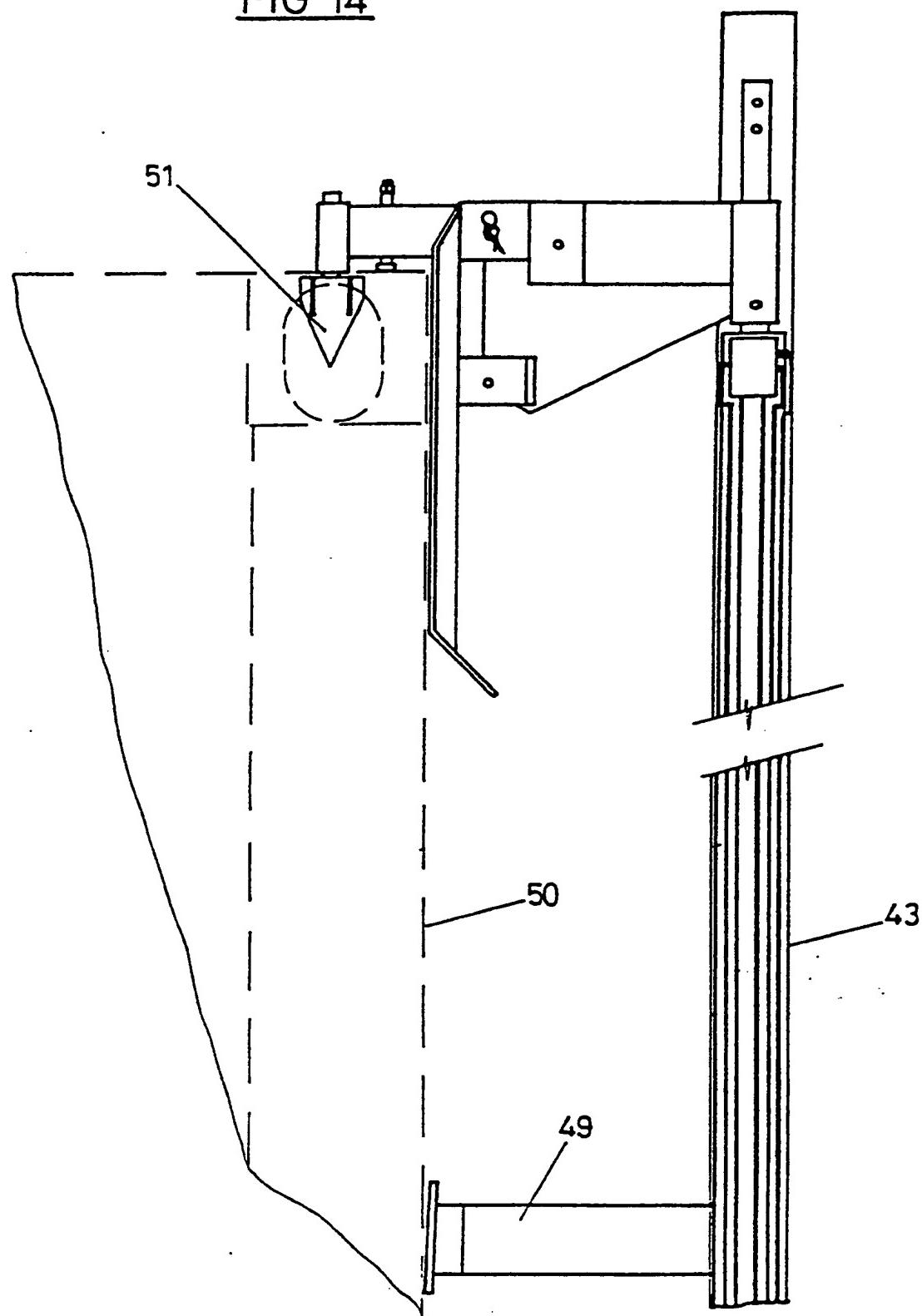
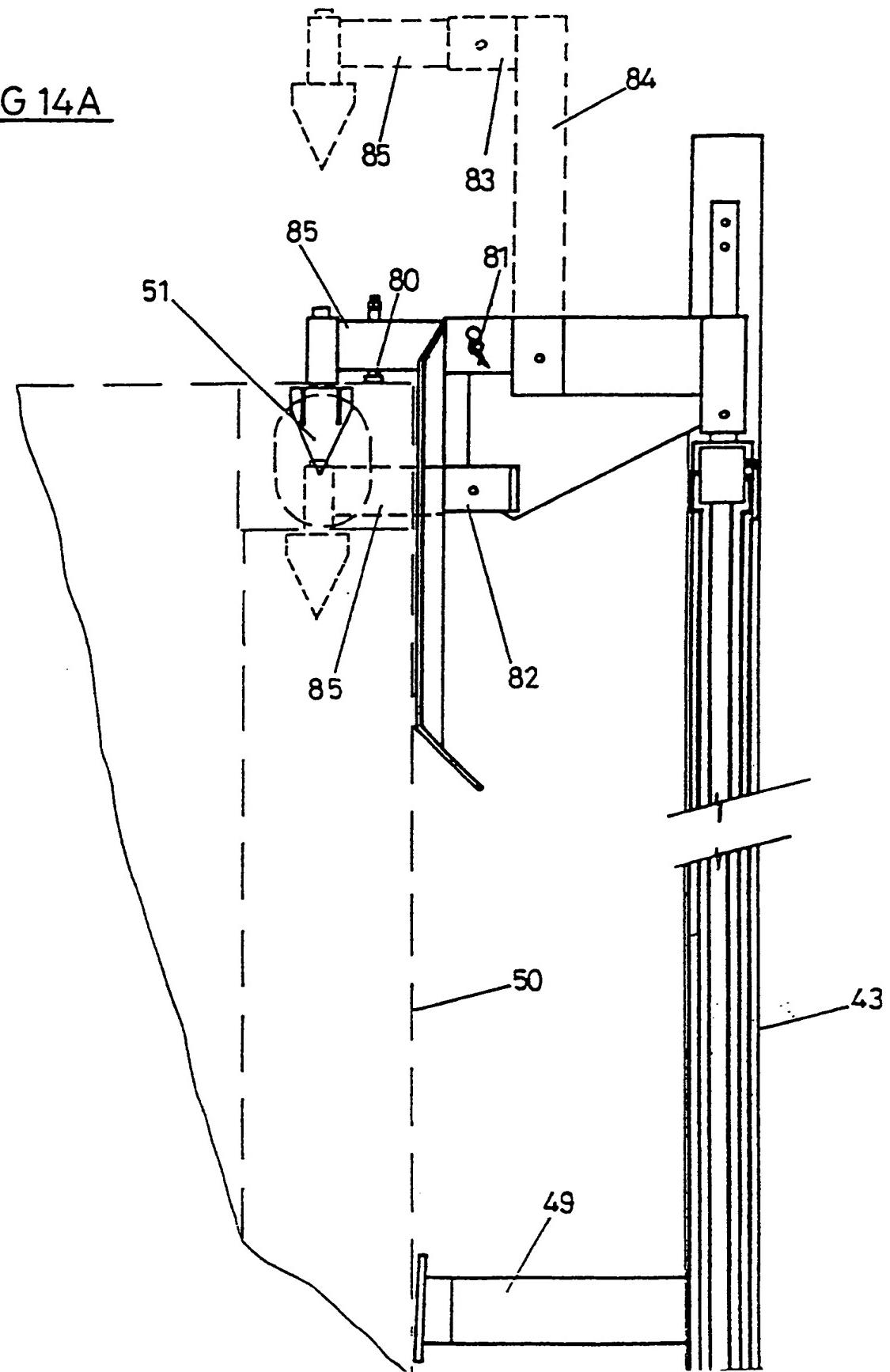
FIG 14

FIG 14A

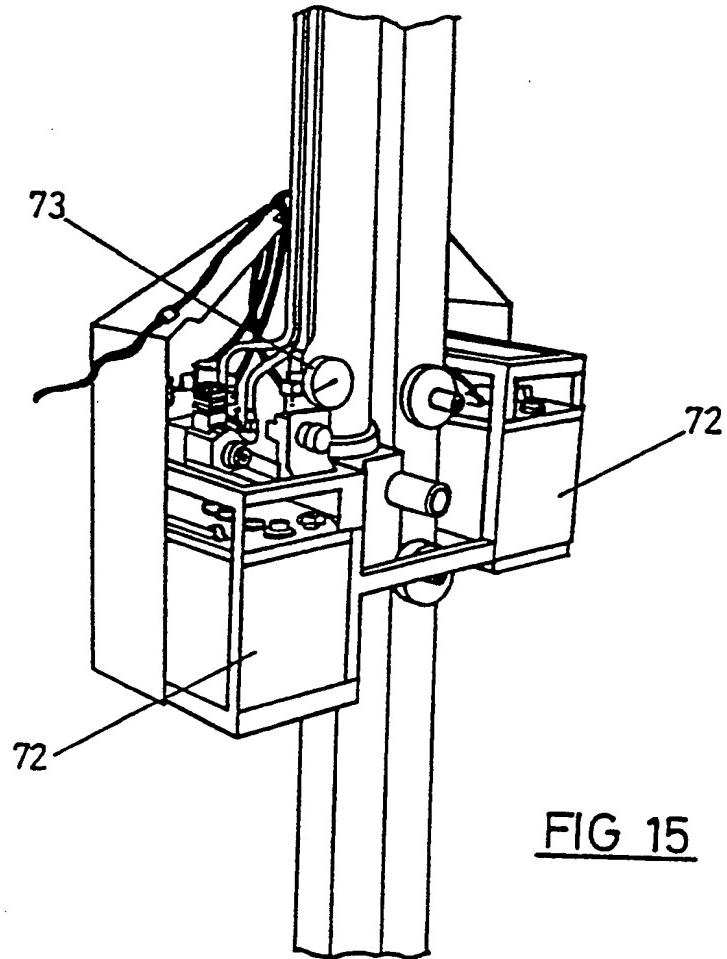
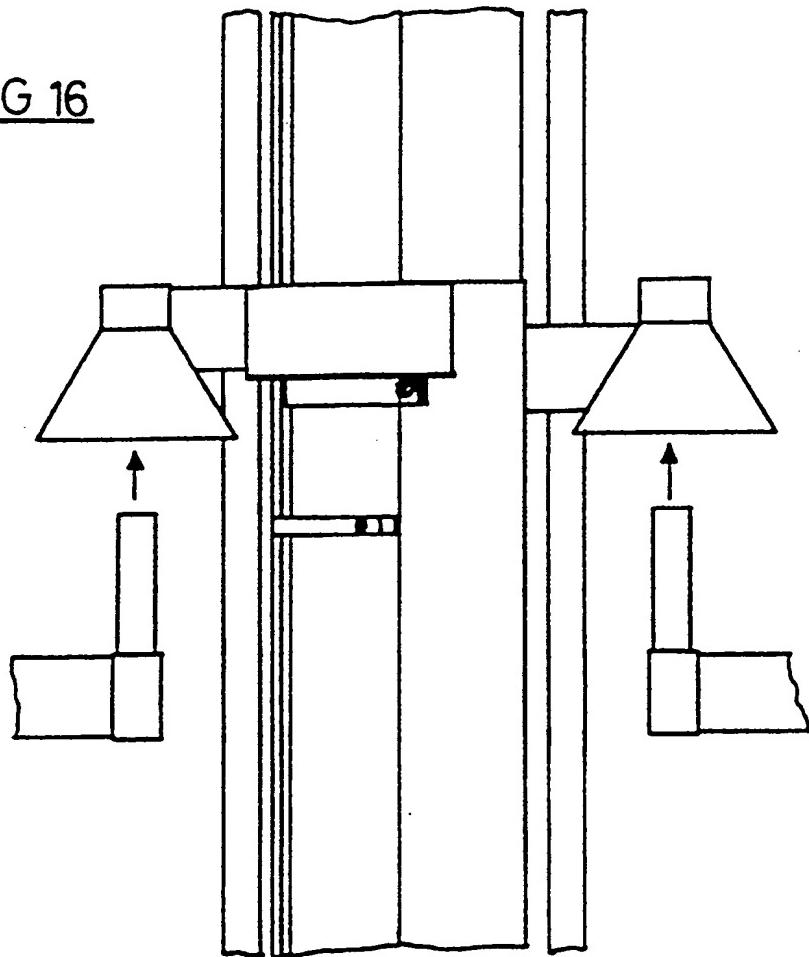
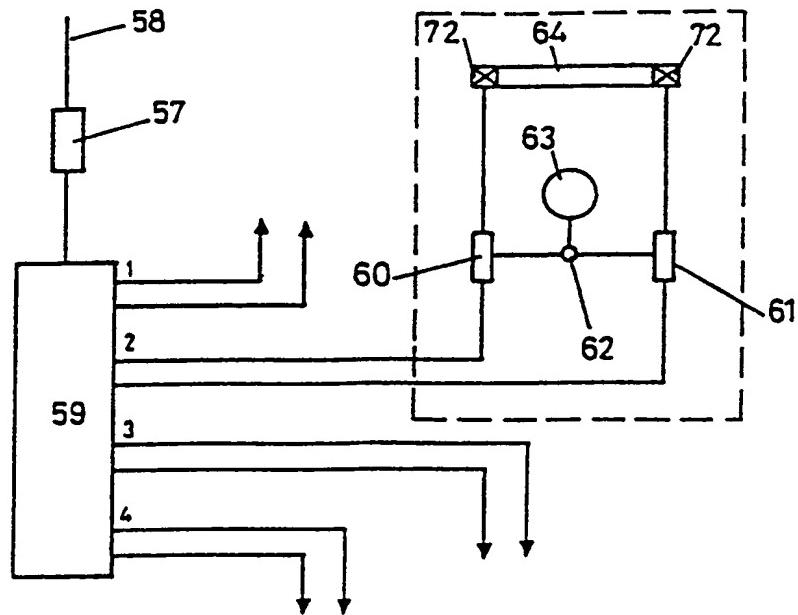
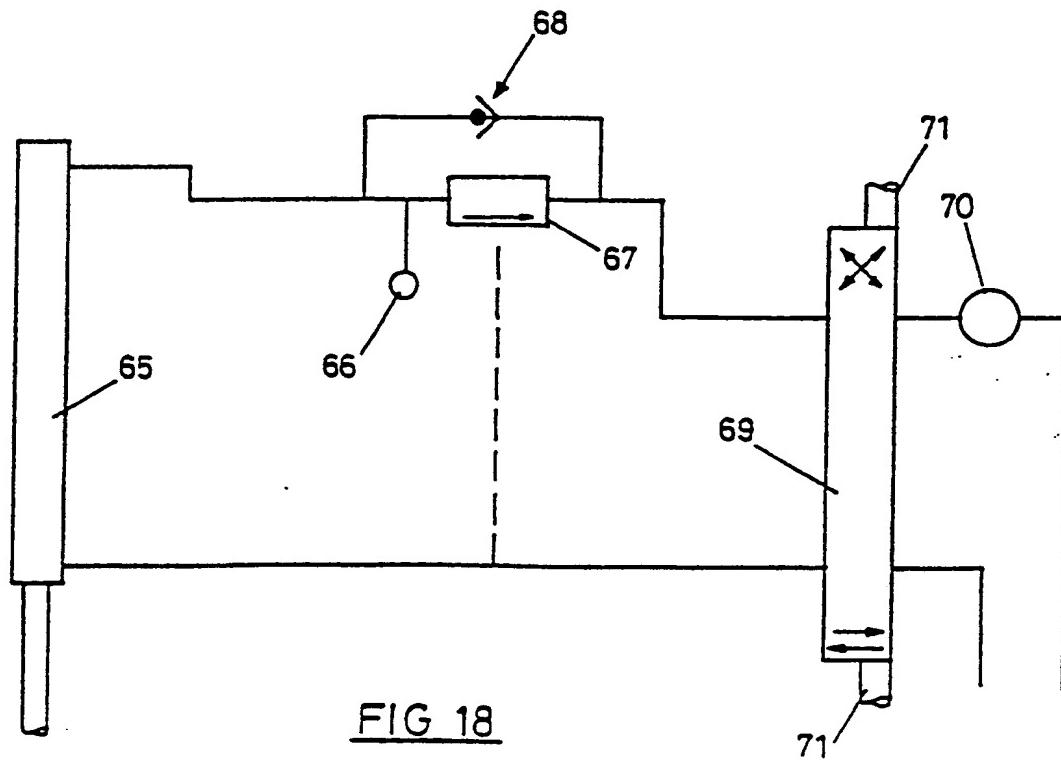
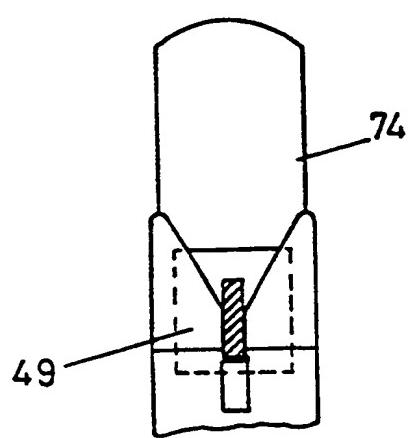
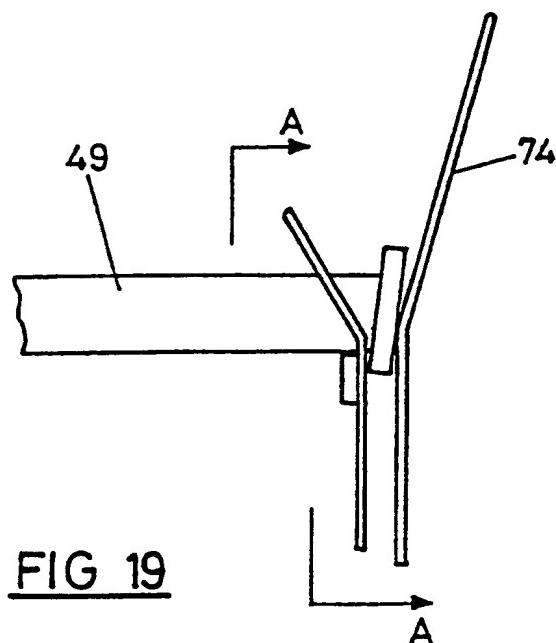


FIG 15

FIG 16



FIG 17FIG 18



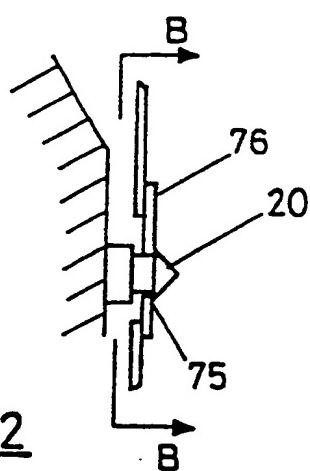


FIG 22

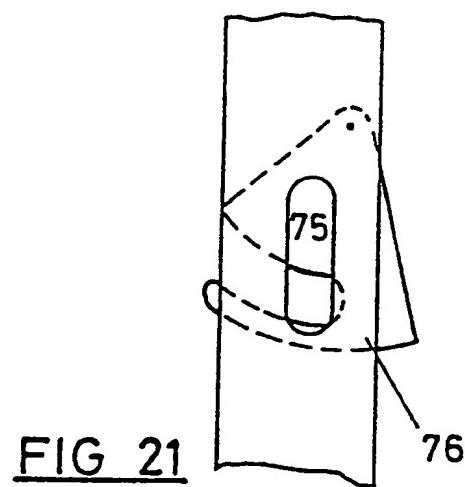


FIG 21

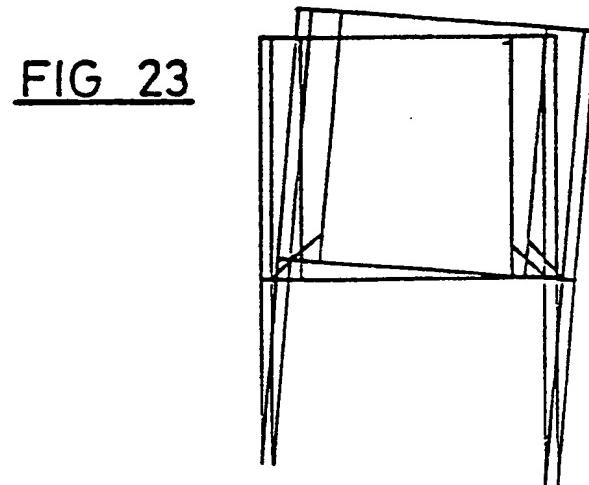


FIG 23

I. CLASSIFICATION OF DOCUMENTS

According to International Patent Classification (IPC) or to both National Classification and IPC
Int.C1.5 B 66 F 3/24 B 66 F 7/04

B 60 P 1/64

II. FIELDS SEARCHED

Minimum Documentation Searched⁷

Classification System	Classification Symbols	
Int.C1.5	B 66 F E 04 G	B 66 C B 60 P

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to the Extent that such Documents are Included in the Fields Searched⁸

III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹

Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
Y	FR,A,2231608 (C. VAN DER LELY N.V.) 27 December 1974, see page 4, line 28 - page 5, line 31; figures 5-7 ---	1-3,5, 11-13, 15-18, 21-24
Y	FR,A,2122760 (HAUSER) 1 September 1972, see page 3, line 13 - page 4, line 11; page 5, lines 6-11; page 6, lines 14-22; figures	1-3,5, 11-13, 15-18, 21-24
A	---	4,6,14
A	US,A,4053073 (FRANCHIN) 11 October 1977, see figures 1,2; column 2, lines 36-43,48-50; column 2, line 65 - column 3, line 2; column 3, lines 13-39 ---	1,7,13
		-/-

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IV. CERTIFICATION

Date of the Actual Completion of the International Search

31-07-1992

Date of Mailing of this International Search Report

11.09.92

International Searching Authority

EUROPEAN PATENT OFFICE

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(CONTINUED FROM THE PREVIOUS PAGE)

Category ^a	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	US,A,3289868 (MILLER et al.) 6 December 1966, see column 3, line 50 - column 4, line 9; figures 1,5 ---	1,7,13
A	FR,A,1575667 (W.E. & F. DOBSON LTD) 25 July 1969, see page 3, lines 13-28; figures ---	1,13
A	AT,B, 373849 (KLETZMAYR et al.) 27 February 1984, see figures; page 3, lines 35,36; page 4, lines 11,12; claims 1,2 ---	1,4,7, 13,14
A	FR,A,1573174 (SOCIETE NOUVELLE DES ATELIERS DE VENISSIEUX S.A.) 4 July 1969 ---	
A	US,A,3157032 (HERPICH) 17 November 1964 ---	
A	FR,A,2504466 (RAYMONDEAU et al.) 29 October 1982 -----	

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EP 9200898
SA 59027

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FR-A- 2231608	27-12-74	NL-A- DE-A-	7307721 2426929	06-12-74 19-12-74
FR-A- 2122760	01-09-72	BE-A- DE-A- GB-A- NL-A- SE-B- US-A-	769202 2135371 1306636 7110813 369293 3749363	03-11-71 03-08-72 14-02-73 25-07-72 19-08-74 31-07-73
US-A- 4053073	11-10-77	None		
US-A- 3289868		None		
FR-A- 1575667	25-07-69	BE-A- CH-A- DE-A- GB-A- NL-A- US-A-	713130 499442 1756106 1189341 6804959 3476275	16-08-68 30-11-70 26-02-70 22-04-70 09-10-68 04-11-69
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FR-A- 1573174	04-07-69	AT-A,B BE-A- DE-A,B,C DE-A- FR-A- GB-A- GB-A- LU-A- LU-A- NL-A- NL-A- US-A- US-A-	304459 728893 2016603 1916023 2043137 1244804 1318528 58332 58392 6905367 7005137 3541598 3637529	15-12-72 01-08-69 26-11-70 30-10-69 12-02-71 02-09-71 31-05-73 15-07-69 09-11-70 14-10-69 13-10-70 17-11-70 25-01-72
US-A- 3157032		None		

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